NEWSLINE

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2008 IN REVIEW

LOOKING BACK AT 2008

A transformative year for the Laboratory

The only constant in calendar year 2008 was change. 2008 was a time of continued transition and transformation for the Laboratory, changes that came in addition to the economic challenges that gripped the nation.

Lawrence Livermore National Security, LLC (LLNS), which took over as contractor for the Laboratory on Oct. 1, 2007, continued the Laboratory's tradition of scientific and technical excellence while instituting cost and operational efficiencies that are positioning the Lab to meet pressing national and global security challenges well into the future.

Employees rose to the challenges of 2008 and delivered on the Laboratory's national security missions with great distinction, delivering award-winning science and technology for National Nuclear Security Administration (NNSA)/Department of Energy programs as well as other national and global challenges. LLNL scientists garnered three R&D 100 Awards and six Nanotech 50 awards. These and other honors served to confirm the Lab's reputation in the larger scientific community.

Stockpile stewardship, complex transformation

LLNL achieved scientific breakthroughs that explain some of the key "unknowns" in weapon performance and are critical to developing the predictive science needed to ensure the safety, reliability and security of the U.S. nuclear deterrent without nuclear testing. In addition, the National Ignition Facility passed 99 percent completion, and a significant portion of LLNL's inventory of special nuclear material was shipped to other sites in support of Complex Transformation.

National and global security

Laboratory researchers delivered insights, technologies and operational capabilities that are helping to ensure national security and global stability. Of particular note, they developed advanced detection instruments that provide increased speed, accuracy, specificity and resolution for identifying and characterizing biological, chemical, nuclear and high explosive threats.

Business and operations

In addition, the Lab continued to transform business and operations practices, reducing costs and putting in place efficiencies that will allow LLNL to take on new science and technology challenges and make the most of opportunities to work for others.

Severe fiscal constraints necessitated major restructuring that led to a reduction in the workforce of more than 1,600 employees between October 2007 and October 2008. A major thrust under LLNS has been to make the Laboratory more efficient and cost competitive, and that effort continued through 2008. In the fiscal year that ended Sept. 30, 2008, the Lab achieved approximately $75 million in cost savings for support activities through organizational changes, consolidation of services, improved governance structures and work processes, technology upgrades and systems shared with Los Alamos.

Those efforts were complemented by initiatives such as the energy conservation task force led by Deputy Director Steve Liedle and fueled by employee ideas and suggestions through a Labwide energy-saving competition entitled "Every Watt Counts."

As part of the ongoing transition to management by LLNS and the effort to make the Laboratory more competitive, benefits also were brought into closer alignment with industry standards. This included the restructuring of medical benefits and the introduction of some new retirement saving options.

Community outreach

The Lab continued a tradition of contributing to the community in myriad ways, from science outreach to raising funds for local nonprofit agencies. LLNS awarded $100,000 through its community gift program as well as $90,000 in one-time gifts. Most of these awards serve children in the Tri-Valley and San Joaquin County, with an emphasis on science and math education and cultural arts.

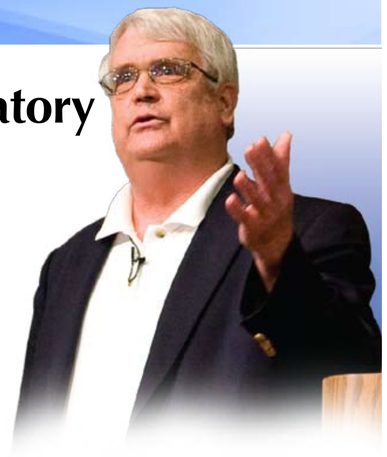
During the annual HOME (Helping Others More Effectively) Campaign, employees raised $1.7 million for local and Bay Area non-profit community organizations. LLNS donated $1 million in matching funds, bringing the total to more than $2.7 million, the largest amount raised in the campaign's 33-year history.

An exceptional year

"2008 was an exceptionally challenging year for the nation and the Laboratory. But in keeping with a long and rich tradition, the Laboratory continued to deliver exceptional science and technology in service to the nation. In addition, we made great strides in transforming our business and operations to better position the Lab for the future," Director George Miller said. "In the individual conduct of our daily assignments, we sometimes lose sight of how much we accomplish collectively over time. This special edition of *Newsline* highlights the events and achievements of 2008 and provides a perspective on what we accomplished as a Laboratory in an eventful year."

Following are selected highlights from calendar year 2008.

For additional details on Laboratory highlights, see the annual report for fiscal year 2008, A Year of Exceptional Achievement *available on the Web at https://www.llnl.gov/annual08/*



"2008 was an exceptionally challenging year for the nation and the Laboratory. But in keeping with a long and rich tradition, the Laboratory continued to deliver exceptional science and technology in service to the nation."

— George Miller, LLNL director

LOOKING BACK AT 2008

JANUARY

Science & Technology

Recent research by scientists at LLNL and UC Merced shows that California temperatures have jumped statewide by more than 2.1 degrees Fahrenheit between 1915 and 2000. The findings were published in the journal *Climatic Change* and included in the "Report to the Governor and Legislature on Climate Change."

The Laboratory hosts a three-day workshop for North African countries to discuss the nuclear safeguards, safety and security challenges associated with the development of a civil nuclear power program. The workshop is attended by officials from nuclear regulatory, research and energy agencies of Morocco, Algeria, Tunisia, Egypt and Jordan.

Laboratory scientists, directed by Salvador Aceves, announce a collaboration with UC Merced's School of Engineering to develop advanced computational tools for analysis of alternative fuel engines that could be transferred to the automotive industry.

Lab researchers and collaborators issue surprise findings after analyzing comet dust returned by NASA's Stardust mission in 2006. The microscopic samples from the comet Wild 2 contained material that formed very close to the young sun, but are the missing ingredients that would be expected in comet dust.

Operations

Combining nearly 300 employee suggestions with those of the "kitchen cabinet" formed under Deputy Director Steve Liedle, the Laboratory identifies $15 million in potential operating cost savings for fiscal year 2008.

After nearly 40 years as a print publication, *Newsline* enters a new era when it transitions to a weekly Web-only format, part of the Laboratory's effort to reduce costs.

"A national security laboratory in a global context" is the vision of the future that Director George Miller outlines to Lab employees in his first all-hands address of the year.

Representatives present a $10,000 check on behalf of Lawrence Livermore National Security, LLC to Tracy Mayor Brent Ives (a Lab employee), in support of the Grand Theatre Center for the Arts.

After more than 30 years of continuous operations, researchers conduct their final experiments in the Laboratory's Bldg. 341 gas-gun facilities.

People

The University of California Board of Regents selects Norman Pattiz as chairman of the Board of Governors of Los Alamos National Security, LLC and Lawrence Livermore National Security, LLC.

Karl van Bibber, chief scientist in the Laboratory's Physical Sciences Directorate and self-professed "science junkie," accepts the position of vice chair of the American Physical Society's California Section. The newly elected executive committee also includes member-at-large Lin Yang from the Laboratory, and a former LLNL scientist, Jennifer Klay.

FEBRUARY

Science & Technology

A paper authored by Chris Marianetti, a postdoc in the Chemistry, Materials, Earth and Life Sciences Directorate, appears in *Physical Review Letters* regarding the dynamical mean-field theory of a material found in superconductors.

To help understand the seismic structure of the deep Earth, researchers, led by Jonathan Crowhurst of the Laboratory's Chemical Sciences Division, study the elastic behavior of an iron-containing mineral under extremely high pressures.

A new study warns there is a 50 percent chance that Lake Mead, a key source of water for millions of people in the southwestern United States, will be dry by 2021 if the climate changes as expected and future water usage is not curtailed.

LLNL is well represented at the annual meeting of the American Association for the Advancement of Science in Boston. Edward Moses, principal associate director for the National Ignition Facility and Photon Science Principal Directorate, was joined by NIF's Chief Scientist John Lindl, at a symposium on high energy laser systems.

Former LLNL Lab Director Michael May and the Global Security Principal Directorate's David Smith appear on a panel entitled "Atomic Detectives: Nuclear Forensics and Combating Illicit Trafficking."

Laboratory researchers led by Ben Hindson report on the development of a rapid diagnostic test that checks cattle for foot-and-mouth disease and six look-alike diseases in the *Journal of Clinical Microbiology*.

Livermore scientist Peter Pauzauskie and colleagues demonstrate a new technique involving nanometer-scale opto-electronic tweezers that allow scientists to manipulate and separate individual semiconducting and metallic nanowires.

Lab scientists Brad Hart, Tim Ratto and colleagues create a compact, low-power unit capable of detecting vapor from oily nerve and blister agents like VX and sulfur mustard. Their work is described in a research paper in the journal, *The Analyst*. The low-power device does not require any consumables, unlike many commercial detectors, making it cost-effective enough for use in environmental and industrial monitoring.

"I think it is important to tell them about the 'invisible occupation': engineering. Nearly everyone knows about other professions, yet many are unaware of what engineers do."

— Kim Christensen, an engineer at NIF on why he volunteers in elementary schools.

Two papers by Chemistry, Materials, Earth and Life Sciences authors are selected as previous year highlights in the journal *Modelling and Simulation in Materials Science and Engineering*.

Operations

LLNS and NNSA's Livermore Site Office approve the LLNS Performance Evaluation Plan, which documents the process and standards of performance by which the Laboratory will be evaluated and rated by NNSA.

Secretary of Energy Samuel Bodman announces President Bush's $25 billion fiscal year (FY) 2009 budget request for DOE, an increase of $1.073 billion more than the FY 2008 appropriation.

The Lab's Industrial Partnerships and Commercialization office is relaunched with a new name, Industrial Partnerships Office, and a new director, Erik Stenehjem.

A Voluntary Self-Selection Option Program approved by NNSA as part of the Lab's 3161 Specific Plan for workforce restructuring, is introduced to employees.

Lab scientists Carol Bruton and John Ziagos kick off the 2008 "Science on Saturday" series at Livermore's Bankhead Theater, with a presentation, "Geothermal Energy – Harnessing the Heat Beneath Your Feet."

John Doesburg, principal associate director for Global Security, announces a realignment of the organization into three programs. The new E Program will focus on energy, environment and nonproliferation. Homeland security is the thrust of S Program, and Z Program is home to the Laboratory's efforts in intelligence analysis and technologies.

Members of the Defense Nuclear Facilities Safety Board visit the Lab for briefings, a tour of nuclear facilities and a hands-on criticality safety class.

Efforts toward energy conservation show signs of success. The Lab's energy usage drops by 4.2 percent in the first quarter of FY08. By resetting the temperature point in Laboratory chillers, along with adjustments to heating and cooling, LLNL saves an estimated $866,000 in the fiscal year.

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LOOKING BACK AT 2008

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People

Deputy Undersecretary of the Navy Marshall Billingslea and Senior Director for Intelligence Wendy Kay visit LLNL.

Microsoft founder Bill Gates tours the National Ignition Facility and the Terascale Simulation Facility.

Lab engineers visit elementary schools in Livermore, Danville and Tracy to celebrate National Engineers Week with 4th and 5th graders.

MARCH

Science & Technology

An LLNL-Sandia National Laboratories team announces it recently demonstrated that the operational status and thermal power of nuclear reactors can be quickly and precisely monitored over hour-to month-time scales, using a cubic-meter-scale antineutrino detector.

Lab astronomers announce they have made the best determination of the power of a supernova explosion long after it was visible from Earth. This technique, using X-ray and optical observations, may help reveal the details of how some stars come to a cataclysmic end.

LLNL begins operating as the lead environmental reference laboratory for the U.S. Environmental Protection Agency that is part of a network of laboratories to analyze environmental samples.

Three LLNL scientists — Jonathan Allen, Shea Gardner and Tom Slezak — show that computational tools could become an important resource in detecting rogue genetically engineered bacteria in environmental samples.

Some 245 science-minded students in grades 7 through 12 from Danville, Dublin, Livermore, Pleasanton and San Ramon gather at the Robert Livermore Community Center to exhibit their projects in the 12th annual Tri-Valley Science and Engineering Fair sponsored by the Lab.

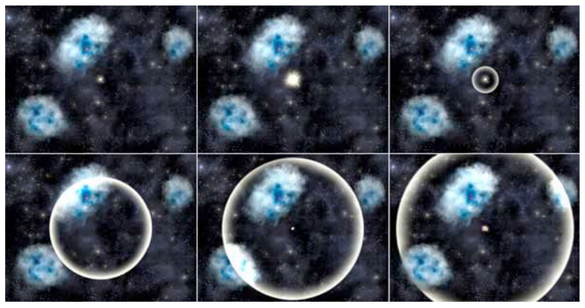
People

Director George Miller is awarded a copy of a state resolution for his work as a member of the California Council on Science and Technology.

Five Laboratory researchers are selected by the American Physical Society (APS) editors as outstanding referees of APS journals: Peter Beiersdorfer, Mau Hsiung Chen and Ian Thompson of the Physical Sciences Directorate, Charles Cerjan of the Weapons and Complex Integration Principal Directorate, along with former LLNL researcher William Hoover.

U.S. Sen. Bob Bennett of Utah and two of his staff members visit the Lab for briefings and tours.

More than 3,500 students, teachers and local residents attend "Science on Saturday" lectures, breaking all attendance records for the popular series.



This sequence of artist's illustrations begins with a bright star surrounded by dust clouds followed by a flash that marks the destruction of the star and ends with a supernova remnant at the site of the explosion.

Robin Newmark of Global Security presents Director George Miller with a copy of the state resolution for his work as a member of the California Council on Science and Technology.

The Lawrence Livermore Laboratory Women's Association presents its annual scholarship awards totaling $7,750 to 12 recipients during a ceremony.

Operations

A strategic plan for the Lab's Scholar Employment and Education Programs, required by Contract 44, is approved by the Livermore Site Office.

Deputy Director Steve Liedle kicks off the Laboratory's friendly competition between teams organized to help reduce energy consumption by 9 percent by October.

Public hearings on the National Nuclear Security Administration's plans to consolidate the nuclear weapons complex attract approximately 200 people scattered over three separate meetings in Tracy and Livermore.

The NNSA announces that it has completed a third shipment of special nuclear material from the Laboratory, reducing high-security material on site by about 25 percent.

APRIL

Science & Technology

A team of Lab scientists tries to solve a mystery that has plagued scientists for more than 65 years: What is the electronic structure of plutonium (Pu), and how does electron correlation in Pu work?

The Laboratory announces work with Quantum Fuel Systems Technologies on a next-generation manufacturing technique for hydrogen storage vessels.

Laboratory scientists collaborating with researchers at the Laboratory for Laser Energetics, CEA France and UC Berkeley are able to determine the equation of state (EOS) for fluid helium at pressures above one million times more than the Earth's atmosphere.

The NNSA approves the next step in the Advanced Simulation and Computing (ASC) program's acquisition of the next generation supercomputer, named Sequoia.

Using optics and expertise developed at LLNL, a laser at the University of Texas demonstrates more than one quadrillion (10^{15}) watts (one petawatt) of power.

Using state-of-the-art supercomputers, Laboratory climate scientists perform a 400-year high-resolution global ocean-atmosphere simulation with results that are more similar to actual observations of surface winds and sea surface temperatures.

LOOKING BACK AT 2008

Lab postdoc Raymond Friddle develops a complete theory to model how force can assist a molecule to change from one configuration to another.

People

Lou Terminello is appointed the Lab's new nuclear forensics leader. The announcement is made by the Global Security and Weapons and Complex Integration (WCI) principal directorates.

Richard Blake, Water Guidance and Monitoring Division leader in the Environmental Protection Department, is appointed by California Gov. Arnold Schwarzenegger to another term on the state Board for Geologists and Geophysicists.

Operations

The Department of Energy approves the Lab's Involuntary Separation Program as part of its 3161 Workforce Restructuring Program.

Lab employees take part in the Earth Day Fair, sponsored by the City of Livermore Beautification Committee and Water Resources Division and the Livermore Area Recreation and Park District at the Robert Livermore Community Center.

University of California officials visit the Laboratory and meet with Director George Miller and Los Alamos Director Michael Anastasio.

The Weapons and Complex Integration Principal Directorate hosts a senior delegation of scientists and government officials from the United Kingdom.

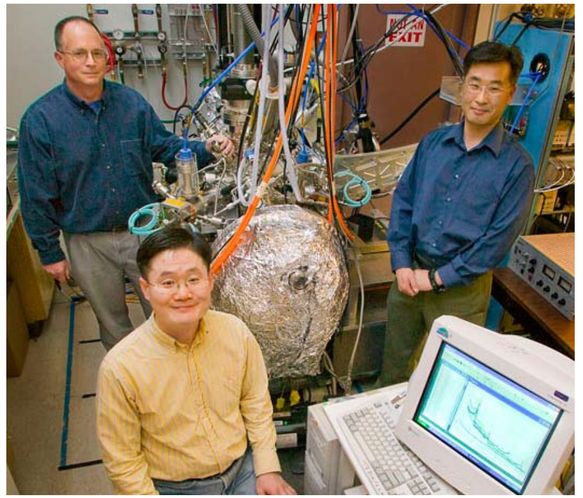
Scott McAllister is appointed leader of LLNL's team of Laboratory Emergency Duty Officers.

MAY

Science & Technology

Carbon dating conducted at the Lab's Center for Accelerator Mass Spectrometry reveals that changes in fat mass in adult humans are due mainly to changes in the volume of fat cells, not in the number of fat cells. These results could help in the development of new pharmaceuticals to battle obesity, high blood pressure and diabetes.

Lab researchers identify the effects of high pressure on the fundamental properties of nanomaterials (specifically, quantum dot solids composed of cadmium selenide nanocrystals), information that may make it easier to manipulate transistors, lasers and solar-energy-conversion devices.



Clockwise from left: Jim Tobin, Brandon Chung and Sung-Woo Yu suround the Fano Detector that they designed and built to resolve mysteries of plutonium.

The Lab's color guard stands at attention during a Memorial Day ceremony.

Genome analysis by a Joint Genome Institute-led international research team reveals that a biomass-degrading fungus, *Trichoderma reesei*, uses a surprisingly small number of genes to produce the enzymes needed to break down the lignocellulose of plant cells walls, highlighting opportunities for efficiently generating enzymes for biofuel production.

A new climate modeling study reveals that geoengineering schemes to mitigate surface warming could detrimentally affect the global water cycle.

Nearly 200 people gather at the Bankhead Theater in downtown Livermore for the Edward Teller Centennial Symposium to celebrate the 100th anniversary of Teller's birth and his scientific legacy. The symposium was co-sponsored by LLNL, the University of California, the Hertz Foundation and Stanford University's Hoover Institution.

Operations

As part of the effort to address a $300 million budget shortfall, 440 career indefinite employees are released in an Involuntary Separation Program. Prior to this action, more than 500 flexible-term and supplemental labor employees are released and 215 career employees take advantage of a voluntary separation program. The overall workforce restructuring effort reduces the Lab's staff to approximately 6,800 employees.

A DOE Office of Health, Safety and Security audit attracts considerable media attention. The audit rates four inspection areas as effective and identifies four that need improvement. Immediate actions are taken to address these areas.

"I was an original employee of Pizza Hut. My boss asked me to take a year off from college to manage his business. I told him there was no future in pizza."

— John Doesburg, principal associate director for Global Security

A Memorial Day ceremony is held at the Veterans Memorial Rose Garden near Lake Haussman and Bldg. 551.

A study of the Lab's Melanoma Surveillance Program, also known as the "Mole Patrol" or "Spot Check," finds that the program reduced employee deaths from this form of skin cancer. This is the first early skin cancer detection campaign ever to have demonstrated a decrease in mortality from melanoma.

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2008 TECHNOLOGY AWARDS & EMPLOYEE RECOGNITION

The Lab's **Jim Felton** received a thank-you letter from Gov. Schwarzenegger for serving on the State Proposition 65 Carcinogen Identification Committee for 15 years. Proposition 65 is the law that warns Californians about coming in contact with harmful chemicals.

Laboratory researchers also garnered three 2008 **R&D 100 awards** for being among the top 100 industrial innovators worldwide in 2007, developing advanced technologies with commercial potential. With this year's awards, the Laboratory has captured a total of 121 such R&D 100 awards since 1978.

Jim Candy, chief scientist for the Engineering Directorate, was awarded the prestigious Helmholtz-Rayleigh Interdisciplinary Silver Medal "for his contributions to signal processing and underwater acoustics" by the Acoustical Society of America (ASA), a society of the American Institute of Physics.

Keith Carlisle, of the Engineering Directorate, received a Defense Programs Award of Excellence "for excellence in planning, managing and executing the modern turning center evaluation and selection process." Carlisle and others from LLNL have been involved in the Los Alamos National Laboratory work on designing the next generation of shell machines for pit production.

LLNL computer scientist **Rose "Rusty" Babcock** was honored with a National Nuclear Security Administration award for assisting Russian officials in developing a national accounting system for civilian nuclear material.

Ronald Page, an undergraduate summer hire, received a Sigma Xi Student Research Award for excellence in undergraduate research based upon his work at the Lab on foreign animal diseases.

Three Lab scientists, **John S. Taylor, Edward Moses and Alan Frank,** were among 72 new fellows elected by the International Society for Optical Engineering (SPIE).

Pamela Hullinger, the Laboratory's chief veterinary officer and leader of its Food and Agricultural Security Program, was inducted into the Alameda County Women's Hall of Fame during its 15th annual awards ceremony.

The California Water Environment Association's Pretreatment, Pollution Prevention and Stormwater committee presented its **"Facility of the Year"** award to the Laboratory's Sewer Monitoring Team in the Environmental Protection Department.

Judy Kim, a graduate student at UC Davis majoring in materials science and engineering and a fellow of the Lab's Lawrence Scholar Program in the Chemistry, Materials, Earth and Life Sciences Directorate, received the John Farrant Memorial Award.

Charlie Westbrook

Eleven Lab employees were named recipients of the Department of Energy's (DOE) **Outstanding Mentor Award** and honored at an onsite reception.

The **Technology Resources Engineering Division (TRED)** received two national safety awards after surpassing one million work hours and 12 months without a lost workday injury or illness. The division has more than 400 employees.

A micro-fuel cell developed by UltraCell Corp. and based on LLNL technology captured the **Best Soldier System Innovation and Technology award** at the Soldier Technology U.S. 2008 conference. The book-sized device can serve as a power source for computing, communications and sensing devices in critical mobile and remote operations.

Computational physicist **Alex Shestakov** medaled in four swimming events at the 2008 FINA World Masters Championship, held in Perth, Australia. At age 59, he took first in the 400-meter individual medley (IM), second in the 200-meter backstroke, third in the 200-meter IM and fourth in the 100-meter butterfly.

The **Lab's Special Response Team (SWAT)** blazed its way to a second-place finish in a shooting competition at the U.S. National SWAT Championships. The annual event brings together 30 top teams from across North America and the U.S. for a week of intense training and competitive simulations of real-world emergencies.

Lisa Poyneer of the Engineering Technologies Division received the 2008 Zuhair A. Munir Award from UC Davis for her dissertation. This was the second award Poyneer received from UC Davis for her dissertation.

Two LLNL fusion pioneers, **Dick Post and John Nuckolls,** were honored for their lifetime contributions to the field of fusion energy by Fusion Power Associates. The award ceremony was held at the Lab, which hosted the annual meeting.

Russell Wallace received the 2008 Larry Foreman Award for Innovation and Excellence in Target Fabrication. The award recognizes Wallace's record of outstanding support to laser experiments using the Nova laser, the University of Rochester's OMEGA laser and the National Ignition Facility.

Computer scientist **Steve Suppe** of the Computation Directorate was awarded a Fulbright Student Grant to study at the University of Haifa in Israel. Suppe will study advanced techniques in information retrieval and data mining of unstructured text.

Lab researchers won six **2008 Nanotech Briefs 50 Awards,** presented by the newsletter, *Nanotech Briefs*. The awards recognized Lab work in energetic nanocomposites, the design and fabrication of functional nanopores and fabrication of transparent ceramics from nanoparticles, as well as the Lab's dynamic transmission electron microscope and a method for nanolipoprotein particle formation. **Yinmin (Morris) Wang** won in the innovator category for his nanoscale research.

The Combustion Institute honored Lab retiree **Charlie Westbrook** with its prestigious Bernard Lewis Gold Medal. The medal was awarded for brilliant research in the field of combustion, particularly on the pioneering development of detailed chemical kinetic mechanisms for use in practical applications.

Stan Howell, the Lab's Small Business Program manager, received a recognition award for his support to the Northern California Small Business and the 8(a) Association, a non-profit organization dedicated to helping its members with resources, education, promotion, support and networking.

More than 50 East Bay members of the United Nations Intergovernmental Panel on Climate Change (IPCC), which includes 40 LLNL former or current employees, were honored by the **East Bay Chapter of the United Nations Association** for winning the recent Nobel Peace Prize for their work on climate change. The **40 Livermore researchers** also were recognized by Lab Director George Miller with one of this year's LLNL Science and Technology (S&T) Awards.

The Laboratory was named one of the **"Top 20 institutions in engineering based on impact"** published by *The Times Higher Education.*

Two groups that routinely work with a wide range of hazards — the Technology Resources Engineering Division and the NIF project — received national safety awards for completing 12 months of work without a single lost day due to injury or illness.

Physicist **Fred Streitz** and fellow computational scientists were recognized for "game changing" supercomputing innovations by Laboratory Director George Miller with one of this year's LLNL Science and Technology (S&T) Awards.

Randy Pico, of the National Security Engineering Division (NSED), was honored as one of five DeVry University "Most Distinguished Alumni" in the university's 25-year history in California.

Retired Lab physicist and computational pioneer **Berni Alder** was inducted into the American Academy of Arts and Sciences at a ceremony in Boston.

Ken Moody was awarded the 2009 Glenn T. Seaborg award by American Chemical Society Division of Nuclear Chemistry and Technology for his work in heavy elements and nuclear forensics.

The Laboratory earned seven **National Nuclear Security Administration Weapons Awards of Excellence.** The awards were given for work performed in 2006 and 2007 for outstanding contributions to the nation's nuclear weapons program. **John Castor and Ken Moody** won individual awards while seven other projects earned team awards.

The 2008 **"Science, Technology, Engineering and Operations" (STEO) awards** were presented to a team that decommissioned the Sustained Spheromak Physics Experiment (SSPX), as well as a group studying the fundamental science of plutonium

Ken Kulander received the 2008 Will Allis Prize from the American Physical Society for the study of ionized gases.

Don Correll and Edward Moses were awarded the distinction of fellow of the American Association for the Advancement of Science (AAAS).

Pamela Hullinger

NOTABLE QUOTES

"You can be stubborn to the point of stupidity and eventually it pays off."

– Chemist Ken Moody, recipient of the 2009 Glenn T. Seaborg award for his work in heavy elements and nuclear forensics.

"'Caring about each other' is more than a catch-phrase to me. It's what defines who we are more than any award could ever do."

– LLNL's Joel Bowers, reflecting on two national safety awards won by his division

"Science is my home. I bring my home with me wherever I go. I think of science that way."

– Alex Chernov, of the Materials Science and Technology Division within the Chemistry, Materials, Earth and Life Sciences Directorate

"He had an amazing way of always getting to the heart of a matter."

– Director George Miller, describing his interactions with Edward Teller at the Teller Centennial Symposium

"There are no computers fast enough to write all the data."

– Physicist David Lange on the Lab's involvement in the multi-national "Large Hadron Collider" (LHC) project.

"This has been a life-changing experience. It really makes you think about your priorities. Work now stays at work."

– Paul Reisdorf on his diagnosis with brain cancer.

Larry Thompson, a LLNL molecular biologist, received the 2008 Environmental Mutagen Society Award.

Two Lab researchers — **Andy MacKinnon and Per Söderlind** — were named 2008 Fellows of the American Physical Society (APS).

The Laboratory received a **2008 Fit Business Silver Award** from the California Task Force on Youth and Workplace Wellness.

The Technical Information Department (TID) won seven awards including a "Best of Show" for *Science & Technology Review* at the Phoenix regional Society for Technical Communications 2008 competition.

The Laboratory received a **2008 WRAP (Waste Reduction Awards Program) Award** from the California Integrated Waste Management Board. The award recognizes California businesses and organizations that have made outstanding efforts to reduce nonhazardous waste by implementing resource-efficient practices, aggressive waste reduction, reuse and recycling activities, and procurement of recycled-content products.

LOOKING BACK AT 2008

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People

Tom Isaacs, head of LLNL's Office of Planning and Special Studies, is named to the National Academy of Sciences' Nuclear and Radiation Studies Board, which oversees studies on the safety, security, technical efficiency, and policy and societal issues arising from the use of nuclear and radiation-based technologies. Isaacs begins a yearlong sabbatical at Stanford University's Center for International Security and Cooperation.

Gerald Talbot, assistant deputy NNSA administrator for Nuclear Safety and Operations, tours the Lab's Superblock, Radioactive Materials Area and Site 300 and meets with Livermore Site Office, LLNL and Sandia employees.

Congressman Rush Holt, chairman of the House Select Intelligence Oversight Panel of the House Committee on Appropriations, visits the Laboratory.

Ray Orbach, DOE undersecretary for Science, visits the Lab for briefings on physics, nuclear chemistry and energy programs and views some of the Lab's high-resolution molecular dynamics simulations.

Ida Shum, a business development executive in the Industrial Partnerships Office, is elected the Far West regional coordinator for the Federal Laboratory Consortium.

Physicist Paul Steele (kneeling) and chemist Keith Coffee make adjustments to the detection system known as Single-Particle Aerosol Mass Spectrometer or SPAMS.

JUNE

Science & Technology

LLNL researchers discover the mechanism that allows carbon nanotube membranes to permit the ultrafast flow of water molecules while rejecting ions that make up common salts.

Researchers report, in the journal *Analytical Chemistry*, the ability of the Single Particle Aerosol Mass Spectrometer or SPAMS to rapidly and almost simultaneously detect biological, chemical, radiological and high explosive threat materials along with illicit drugs.

Extreme ultraviolet lithography (EUVL), a next-generation technology for manufacturing computer chips, wins an important industry endorsement when the silicon foundry giant Taiwan Semiconductor Manufacturing Co. placed EUVL on its roadmap for producing 15 nanometer feature-size computer chips in the future. Lab scientists have been involved in EUVL research since the mid 1990s.

Research reports in the journal *Nature* suggest that ocean temperature increases and the associated rise in sea level between 1961 and 2003 were 50 percent greater than previously estimated. The research corrects for small but systematic biases recently discovered in the global ocean observing system and demonstrates that the climate models realistically simulate ocean temperature variability.

Operations

The Lab enters into mentor/protégé agreements with two small businesses — Dynamac Corp., an environmental systems and waste minimization business, and MJ Avila, a general construction company — as part of the new LLNS management contract.

A center for issuing the new federal credential to LLNL and Sandia employees and Bay Area federal employees is set up at the East Gate.

More than 130 local science teachers are welcomed to the Lab for the Teacher Research Academy.

People

Computational physicist George Michael dies at the age of 82. Michael, who joined the Lab in 1953, played a central role in building LLNL's high-performance computing program and its international reputation as a leader in supercomputing, and founded the annual Supercomputing Conference.

Steve Patterson, associate director for Engineering, leaves the Laboratory.

JULY

Science & Technology

Lab scientists discover a new physical phenomenon that enables them to see high-frequency waves by combining molecular dynamics simulations of shock waves with an experimental diagnostic, terahertz (THz) radiation.

Researchers announce they have devised a method to distinguish mine collapses from other seismic activity. The new technique could help researchers better differentiate underground nuclear tests from earthquakes, mine collapses, mine blasts and other events that generate seismic waves. The new research appears in the journal *Science*.

The Asia-Pacific Forum on Integration of Sustainability, Safety and Security of Nuclear Technology is held at UC Berkeley, attracting about 70 nuclear engineers, scientists, professors and atomic energy commission members from a number of nations, including researchers from the Laboratory, who helped organize and run the conference.

Researchers announce that an instrument originally designed at the Lab to detect the malicious use of biological pathogens can be adapted for use in the public health sector to rapidly screen people for tuberculosis. The system, SPAMS, is described in *Analytical Chemistry*.

Lab scientists and engineers provide technical leadership to NNSA's work to transform the U.S. nuclear weapons complex and stockpile by shrinking the size of both and finding more cost-effective ways to maintain the remaining weapons.

Operations

During a special media roundtable in Washington D.C., NNSA Administrator Tom D'Agostino and the directors of the three weapons laboratories discuss the National Nuclear Security Administration's plans for Complex Transformation and its benefits to the nation.

In DOE's Academies Creating Teacher Scientists program at the Lab, teachers spend eight weeks working with a scientist mentor to gain experience doing actual science and develop knowledge, methods and skills to use in instruction when they return to the classroom.

During a 'Fun with Science' event, the Lab's Mike Revelli guides a student volunteer as he lowers a vinyl glove into liquid nitrogen to demonstrate how material properties can change with temperature.

LOOKING BACK AT 2008

NNSA announces that a sizable amount of fissile material was removed from nuclear weapons sites this fiscal year. As of July, 12 metric tons (or more than 26,000 pounds) of plutonium and highly enriched uranium had been shipped away for disposition. At LLNL, the inventory of special nuclear material is reduced by 25 percent.

People

Students in the Bay Area News Group's award-winning Book Buck$ Family Reading Program visit the Lab's Discovery Center for hands-on activities and a "Fun with Science" show as a reward for exceeding their Book Buck$ reading assignments.

Lab atmospheric scientist Phil Duffy testifies at a congressional hearing on the federal response to the California drought emergency, discussing how California's water supply is highly vulnerable to climate change.

AUGUST

Science & Technology

Lab researchers create a three-dimensional image of a material referred to as liquid smoke. The material is aerogel, an open-cell polymer with pores smaller than 50 nanometers in diameter.

Livermore scientists working as part of the U.S. Climate Change Science Program release a report on computer climate models and their ability to simulate current climate change.

By using a high-power laser to dynamically compress materials to high pressures, Lab scientists announce the development of a new technique to identify phase transitions that may one day reveal the interior structure of "super Earth" planets.

Operations

During an all-hands meeting, Director George Miller reports on the Lab's internal progress and external recognition. His address kicks off a special series of all-hands presentations slated for August by principal associate directors, who will discuss changes, accomplishments and future challenges in their respective organizations.

The Energy Management Group reports that the Lab's goal to decrease energy usage by 9 percent by Oct. 1 is within reach, with energy savings at 7.81 percent.

"Looking Ahead and Embracing Our Diversity" is the theme of the Lab's 10th annual Day on the Green diversity celebration.

In an effort to ensure a drug-free workplace, the Lab announces a new drug testing policy whereby all employees and subcontractors with an L or Q clearance are included in a random drug-testing pool.

A new double-door portal for pedestrians and bicyclists at Eastgate Drive and Greenville Road opens to enhance physical security and solve traffic safety issues.

The Lab's SAFE counterintelligence office moves to Bldg. 132 North.

People

Camille Yuan-Soo Hoo, Livermore site manager, announces that she will transfer to a new assignment for NNSA, effective Nov. 1.

Alice Williams, associate administrator for Infrastructure and Facilities Management at NNSA headquarters, is named the new LSO administrator, replacing Camille Yuan-Soo Hoo.

Deborah Wince-Smith, president of the Council on Competitiveness, presents a DDLS lecture entitled, "The Innovation Imperative for the United States," outlining the challenges of U.S. competitiveness.

James Jones, a firing tank operator in the Lab's B Division High Explosives Application Facility, returns from a 13-month tour of duty in Iraq with the California National Guard.

Two government affairs officials from Los Alamos National Laboratory — Patrick Woehrle of LANL's Government Affairs Office and David Lyons, who works in the Washington D.C. office — visit the Lab.

James Jones (left) presents Mike Dunning, B Division Program leader, with a T-shirt and other mementos from his tour of duty in Iraq.

SEPTEMBER

Science & Technology

The first proton beam is circulated through the 17-mile-long Large Hadron Collider, the world's most powerful particle accelerator located at the CERN particle physics research center near Geneva, Switzerland.

Laboratory researchers use ionic liquids to improve the crystal quality and purity leading to safer explosive materials. This work appears in the journal *Physical Chemistry Chemical Physics*.

Laboratory researchers, along with colleagues at the University of Texas at Austin and other institutions, recreate pressures in materials similar to Earth's mantle and determine that materials in the lowermost mantle of Earth display unexpected atomic properties that may lead to clues about what goes on deep down inside the planet.

Through first-principle molecular dynamics simulations, Laboratory scientists together with UC Davis collaborators, use a two-phase approach to determine the melting temperature of ice VII (a high-pressure phase of ice) in pressures ranging from 100,000 to 500,000 atmospheres. The article appears in the *Proceedings of the National Academy of Science*.

Operations

The annual Laboratory Directed Research and Development symposium by the DOE/NNSA national laboratories is held in Washington D.C. and focuses on energy security. This year's symposium is organized by LLNL's Institutional Science and Technology Office.

The Engineering Directorate reports a $100,000 per year savings in energy and maintenance costs in the Bldg. 131 High Bay after equipment (dehumidifiers and a vacuum system) deemed no longer needed for programmatic requirements is shut down.

Ed Moses, principal associate director of the National Ignition Facility and Photon Science Directorate, gives the final presentation in a series of all-hands meetings detailing the Lab's ongoing scientific, technical and operations activities.

After working with the Contractor Assurance Office continuous improvement organization, the Chief Financial Office announces savings of close to $500,000.

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LOOKING BACK AT 2008

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The Record of Decision for the cleanup of historical environmental contamination at Site 300 is approved by LLNL, DOE and federal, state and local regulatory agencies, presenting the final selected cleanup actions and standards for most of the site.

People

Six award winners of the 2008 Tri-Valley Science and Engineering Fair sponsored by LLNL are among 300 students selected nationwide as semifinalists in the Society for Science and the Public U.S. middle-school competition and vie for more than $40,000 in scholarships.

The Laboratory's Rick Blake is elected president of the California State Board for Geologists and Geophysicists in Sacramento.

Former Secretary of State George Shultz, Congressman Dan Lungren and Sidney Drell, arms control expert and deputy director emeritus of the Stanford Linear Accelerator Center, visit the Laboratory.

OCTOBER

Science & Technology

"In high school, I was trying to decide between being an artist or going into physics. My older brother at the time was a graduate student in physics at MIT and he said 'There's no way you'll make it in physics at MIT.' That was a challenge for me. So I went to MIT and majored in physics. Of course, now my brother says he can't remember ever saying that to me."

— **Cherry Murray, principal associate director for Science and Technology**

A 100-day plan for S&T is introduced, with Tomás Díaz de la Rubia, the Laboratory's chief research and development officer, leading the new effort. The expected outcome is a five-year roadmap to direct the Laboratory's investment and workforce strategy for the future.

Research conducted by the Laboratory's Willy Moss and Mike King, using computer simulations, reveals the effects on the brains of soldiers who have been exposed to explosions. The research is featured in *New Scientist*.

At a press conference held on site, the Lab's adaptable radiation area monitor is demonstrated to local news organizations, reporters and photographers.

An online edition of the journal *Nature Materials* features the research of Lab scientists on new void analysis tools that may revolutionize the process of creating new solar panels, flat-panel displays, optical storage media and myriad other technological devices.

In its best year ever for securing royalty income from technology licenses, the Laboratory garners more than $9 million in 2008 fiscal year.

The San Joaquin Expanding Your Horizons Conference is held at the University of the Pacific (UOP) in Stockton. More than 300 young women attend the annual conference organized by LLNL, Sandia and UOP volunteers.

David McCallen and Shawn Larsen discuss new supercomputing simulation capabilities that allow scientists to better understand the effects of earthquakes on buildings and complex structures in an article in the fall edition of *SciDAC Review*.

Operations

The Chief Financial Office implements the Project Costing Implementation Project. Better known as PCI, this project is one element of an overall plan to streamline the Lab's business and financial management systems.

Officials from California State University (CSU) East Bay visit the Lab to recognize nine participating students of the 2008 Science and Teacher Research (STAR) program, a partnership of CSU and DOE national labs and NASA Ames Research Center.

The Environmental Protection Department reorganizes, moving from six to three divisions that are more functionally based, to optimize its resources and allow it to meet changing Laboratory and environmental regulatory requirements.

The Laboratory reaches and surpasses its goal of reducing energy consumption by 9 percent by Oct. 1, with a 9.94 actual percentage reported by the Energy Management Program.

The Lab's 2008 HOME Campaign, the annual charity drive in its 34th year, kicks off with the traditional Run for HOME event that has a 1970s theme.

Deputy Director Steve Liedle announces discussions by LLNL and Sandia/Livermore representatives on ways to optimize the use of both facilities and real estate for the two laboratories, while continuing to manage and perform separate missions.

Tomás Díaz de la Rubia, is named the Laboratory's chief research and development officer and the principal deputy to Science and Technology Principal Associate Director Cherry Murray. The realignment and redeployment of key personnel within the Science and Technology (S&T) Principal Directorate include the merger of the Chemistry, Materials, Energy and Life Sciences Directorate with the Physical Sciences Directorate to form the Physical and Life Sciences Directorate, with Bill Goldstein heading it up.

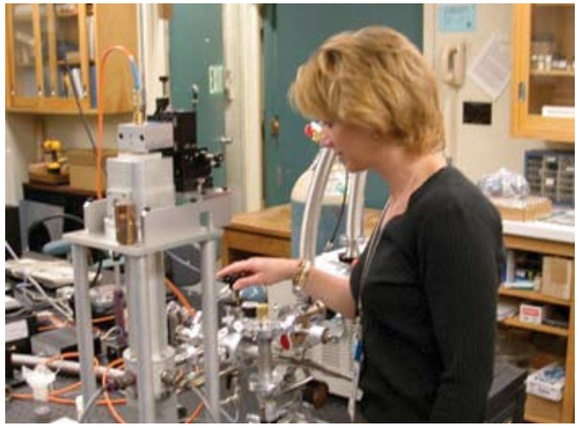
The Cyber Security Program promotes October as National Cyber Security Awareness Month and launches a campaign to inform employees on ways to thwart cyber attacks and threats and protect their privacy both at work and at home.

People

Former Deputy Director and physicist Duane Sewell, a "founding father" who helped shape the Laboratory for more than four decades, dies in Livermore at the age of 90.

Pulitzer Prize winner Richard Rhodes presents "The Twilight of the Bombs" at Livermore's Bankhead Theatre. The presentation kicks off a series of community lectures featuring renowned commentators and is sponsored in part by LLNS.

Tom Campbell, a former congressman from California's 12th and 15th districts, the current dean of the Haas School of Business and a professor of business administration at UC Berkeley, visits the Lab.



Lab scientist Chantel Aracne monitors a high-pressure experiment using a designer diamond anvil cell.

LOOKING BACK AT 2008

NOVEMBER

Science & Technology

Using the Keck and Gemini land-based telescopes, LLNL astronomers for the first time take snapshots of a multi-planet solar system, much like ours, orbiting another star. The research appears in *Science*.

John Doesburg and Tomás Díaz de la Rubia are stayin' alive during the 'Run for HOME' festivities.

In a unique collaboration, the Laboratory teams with 10 computing industry leaders to accelerate the development of powerful next-generation Linux clusters in a project dubbed Hyperion. The project debuts at SC08 in Austin, Texas.

Research conducted by Livermore scientists on the use of carbon nanotubes for molecular transport is the cover story in the Nov. 11 issue of the *Proceedings of the National Academy of Sciences*.

Laboratory researchers create more than 100 billion particles of anti-matter in the Laboratory, which opens the door to several fresh avenues of anti-matter research, including an understanding of the physics underlying various astrophysical phenomena such as black holes and gamma-ray bursts.

Laboratory, industry and academic officials meet in San Francisco for a three-day workshop to discuss climate change impacts and policy for the Western United States energy system. The Lab, in conjunction with PG&E, sponsored the second annual Western Region Energy Workshop.

Tómas Díaz de la Rubia, the Laboratory's chief research and development officer, rolls out initial results of the five-year S&T roadmap planning process — an integrated investment strategy for the next five years.

The Lab's Military Academic Research Associates (MARA) Program receives high marks in an article published in the U.S. Coast Guard Academy's October 2008 newsletter, *The Bulletin*.

Operations

Open Enrollment is under way, allowing employees to make changes to their benefits.

As a result of a competitive bidding process, the Lab adds Anthem Blue Cross EPO (Exclusive Provider Organization, a self-insured HMO) and eliminates Health Net and PacifiCare HMOs.

Sodexo Government Services reduces its café services because of escalating increases in operating costs.

The NIF and Photon Science Principal Directorate coordinates a Labwide canned food drive to benefit the Open Heart Kitchen.

The Lab brings its popular lecture series "Science on Saturday" to Tracy for a second year.

The Emergency Programs Organization kicks off the FY2009 drill and exercise program with a shelter-in-place drill.

The DOE Employee Concerns Program issues a survey to all DOE employees and contractor employees.

The Lab conducts two different safety "pauses" involving work in high explosives and beryllium.

Deputy Director Steve Liedle recognizes the overall winner in the "Every Watt Counts" campaign for 2008 that acknowledges energy-savings measures implemented across the Lab. The overall winner for 2008 was the Weapons and Complex Integration Principal Directorate.

The Laboratory revises policy provisions on reasonable accommodation in the Lab's Personnel Policies and Procedures Manual (PPPM) to include additional protections for employees who are medically removed from beryllium work.

People

Gov. Arnold Schwarzenegger tours the National Ignition Facility and holds a press conference to discuss the nearly completed laser and applications, particularly the Laser Inertial Confinement Fusion-Fission Energy project, or LIFE.

"This fusion energy which creates no greenhouse gases is really gigantic. I can't wait for this to become a reality here. It would provide so much energy. We're talking here about power thousands more watts than lighting up the whole United States. For us to be at the forefront of this in California is really terrific."

— **Gov. Arnold Schwarzenegger on NIF**

Christine Orme, a staff scientist in the Physical and Life Sciences Directorate, is elected to the board of the Materials Research Society (MRS), an organization of materials researchers from academia, industry and government

In his last quarterly all-hands meeting for 2008, Director George Miller recognizes recent awards and accomplishments, emphasizes the importance of safety vigilance, and discusses the success of Lab cost efficiencies, developments from Washington D.C. and other topics.

IPO Director Erik Stenehjem and Principal Associate Director for NIF and Photon Science Ed Moses are featured presenters at an Innovation and Entrepreneurship conference hosted by the City of Pleasanton and Pleasanton Chamber of Commerce.

More than 100 bikers ride to Site 300 to raise money for the Lawrence Livermore Laboratory Armed Forces Veterans Association scholarship fund for veterans and the Alameda County Firefighters Association.

Volunteers from the Lab prepare and serve breakfast for more than 70 residents of the Livermore Veterans Hospital Convalescent Facility.

Deputy Director Steve Liedle recognizes Cathy Aaron, Steve Grace and Michael Mosby for recently completing five months of training and two process improvement processes each. Aaron, Grace and Mosby became the first certified Lean Six Sigma Black Belts under the current contract.

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LOOKING BACK AT 2008

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Native American Indian Heritage Month kicks off with speaker Honorable Chairwoman Donna Begay, the tribal chairwomen of the Tubatulabal of Kern Valley and owner and CEO of Native American Virtual Advancement and Technology.

Ed Moses briefs Gov. Arnold Schwarzenegger on the energy implications of the National Ignition Facility (NIF) and the Laser Inertial Fusion-fission Energy (LIFE) program.

The HOME Campaign raises $1.7 million for local nonprofits. LLNS delivers on its pledge to match employee donations up to $1 million, bringing the campaign total to $2.7 million.

NIF raises $800 and collects enough food items to fill 100 boxes for Open Heart Kitchen, as well as raising $2,500 in a silent auction for Brighter Holidays.

The plan to transform and downsize the NNSA infrastructure moves forward as Administrator Thomas D'Agostino signs two formal decision documents to begin its implementation.

As part of the Lab's continuing effort to improve communications, a new wireless service is announced for use by guests.

As the contractor for the Lab, LLNS announces it is working toward reverification of its Integrated Safety Management System as a requirement of the contract transition.

> "Perth is a long way away and there were few Americans competing. I decided that I wasn't going to pay all that money to go there and just watch."
>
> **— Alex Shestakov, LLNL computational physicist on how he ended up swimming in the 2008 FINA World Masters Championship**

A cyber security threat is found to affect multiple versions of Internet Explorer and as a countermeasure, the Lab's Cyber Security Program temporarily blocks certain types of content.

The Lab's Emergency Programs Organization conducts its last shelter-in-place drill for 2008.

DECEMBER

Science And Technology

Researchers from the Laboratory and two other institutions test a universal personal decontamination system that works for almost any toxic or hazardous chemical.

LLNL's Global Security Principal Directorate and the NNSA co-sponsor a workshop on nuclear security in Central Asia.

> "He evolved a scheme where he could take any fuel in the world and generate a way to make it better and work more efficiently."
>
> **— Director Emeritus Bruce Tarter on retired scientist Charlie Westbrook's work in combustion research.**

The Laboratory and American Shale Oil, LLC (AMSO) announce they have entered into a technical cooperation agreement to develop carbon sequestration technologies for inground shale oil production processes.

Lab researchers and German colleagues announce they have found a new way to more efficiently convert chemical energy into mechanical response without generating heat or electricity first. The team is led by LLNL's Juergen Biener.

Members of the Autonomous Pathogen Detection System (APDS) team are recognized in a Bldg. 132 South ceremony by the Global Security Principal Directorate for the one-year anniversary of the system's use in the Department of Homeland Security's BioWatch Program. For the past 12 months, APDS has been deployed in a major East Coast city.

Operations

The NNSA's Livermore Site Office completes its assessment of LLNS fiscal year 2008 performance in managing the Laboratory. Based on this assessment, in coordination with NNSA headquarters, LLNS is awarded a total fee of $37,658,235, or approximately 70 percent out of a possible $53,742,169 available for the management and operation of the Laboratory in fiscal year 2008.

People

President-elect Barack Obama nominates Steven Chu, director of the Lawrence Berkeley National Laboratory, to be Secretary of Energy.

Energy Secretary Samuel Bodman makes a farewell visit to the Lab.

Karl van Bibber announces he has accepted a post of vice-president and dean of research at the Naval Postgraduate School in Monterey.

Chemical engineer William Smith holds a decontamination system currently used by the military — called Reactive Skin Decontamination Lotion.